CLAIMS

SUB B66

1. A digital image padding method in which padding of pixel values is performed to a digital image signal forming an original image space comprising an image having an arbitrary shape and comprising significant pixels and insignificant pixels, said method comprising:

a pixel rearrangement step in which plural pixels in the original image space are grouped according to a prescribed rule to form plural small image spaces each comprising pixels of the same group; and

a pixel padding step in which values of insignificant pixels in each small image space are replaced by padding pixel values generated by a prescribed method.

2. The digital image padding method of claim 1 wherein in said pixel rearrangement step, sampling is performed by extracting pixels every (N + 1)-th (N: positive integer) pixel in a prescribed direction of the original image space (N + 1) times by using the first to the (N + 1)-th pixels as starting sample pixels, to form (N + 1) pieces of small image spaces each comprising a prescribed number of pixels obtained by one padding.

3. The digital image padding method of claim 2 wherein

operation values obtained by performing operation on values of significant pixels in an n-th (n=1, 2,…, N+1) small image space are used as the padding pixel values for replacing the values of insignificant pixels in the n-th small image space.

4. The digital image padding method of claim 2 further comprises an image space restoring step in which plural pixels forming padded small image spaces are rearranged according to a rule adapted to the prescribed rule of the grouping so that the pixels forms a restored image space which has the same pixel rearrangement as the original image space.

5. The digital image padding method of claim 4 wherein operation values obtained by performing operation on values of the significant pixels in an n-th (n=1, 2,…, N+1) small image space are used as the padding pixel values for replacing the values of the insignificant pixels in the n-th small image space.

SUB B6 6. The digital image padding method of claim 1 wherein in said pixel rearrangement step, sampling is continuously performed twice using the first and second pixel rows as starting sample pixel rows, by extracting pixels on every other pixel row in the vertical direction of the original image space, to form first and second small image spaces each

comprising a prescribed number of pixels obtained by first and second samplings, respectively.

7. A digital image padding method in which padding of pixel values is performed to a digital image signal forming an original image space comprising an image having an arbitrary shape and comprising significant pixels and insignificant pixels, said method comprising the steps of:

dividing the original image space into a first small image space comprising pixels on odd-numbered pixel rows in the original image space and a second small image space comprising pixels on even-numbered pixel rows in the original image space; and

generating first padding pixel values from values of significant pixels in the first small image space and replacing values of insignificant pixels in the first small image space with the first padding pixel values, and generating second padding pixel values from values of significant pixels in the second small image space and replacing values of insignificant pixels in the second small image space with the second padding pixel values.

8. A digital image padding method in which padding is performed to a digital image space forming an original image space comprising an image having an arbitrary shape and

comprising significant pixels and insignificant pixels, by replacing values of insignificant pixels by padding pixel values determined from values of significant pixels in the original image space, wherein

significant pixels which have values used for determining the padding pixel values are pixels other than pixels adjacent to insignificant pixels to be padded.

9. The digital image padding method of claim 8 wherein significant pixels which have values used for determining the padding pixel values are one pixel apart from the insignificant pixels to be padded.

10. An image processing apparatus for performing image coding, which comprises correlation identifying means for identifying correlation between pixel values of a digital image signal and outputting a sample identifier according to the identification result, a coding section for performing differential coding to the digital image signal by the use of a prediction image signal according to the sample identifier and outputting a coded image signal, and a predicting section for producing the prediction image signal based on a decoded image signal in which the coded image signal has been locally decoded,

said coding section comprising:

a subtracter for computing difference between the digital image signal and the prediction image signal as a difference image signal;

data compressing means for compressing the difference image signal to produce a compressed difference image signal; and

a variable length encoder for performing variable length coding to the compressed difference signal, and

said predicting section comprising:

data expanding means for expanding the compressed difference signal to produce an expanded difference signal;

an adder for adding the expanded difference signal to the prediction image signal to produce a decoded image signal;

padding means for performing padding according to the sample identifier by rearranging pixels in an image space formed by the decoded image signal and replacing values of insignificant pixels in the image space where the pixels have been rearranged with padding pixel values generated by a prescribed method; and

prediction image signal producing means for producing the prediction image signal from the padded decoded image signal according to the sample identifier.

11. The image processing apparatus of claim 10 wherein said coding section further comprises padding means for performing padding to the difference image signal according to the sample identifier by rearranging pixels in an image space formed by the difference image signal and replacing values of insignificant pixels in the image space where the pixels have been rearranged with padding pixel values generated by a prescribed method, and said data compressing means performs information compression to the padded difference image signal to produce a compressed difference signal.

12. An image processing apparatus for performing image decoding, which comprises a reproducing section for reproducing a coded image signal in which a digital image signal has been coded by the use of a prediction image signal of the digital image signal and outputting a reproduced image signal, and a predicting section for producing the prediction image signal from the reproduced image signal,

said reproducing section comprising:

a data analyzing unit for analyzing the coded image signal to extract a compressed difference signal of the digital image signal and a sample identifier indicating correlation between pixel values of the digital image signal, from the coded image signal;

data expanding means for expanding the compressed difference signal to produce an expanded image signal; and

an adder for adding the expanded difference signal to the prediction signal to produce the reproduced image signal, and

in said predicting section,

using at least one of the reproduced image signal and the prediction image signal obtained from the reproduced image signal as a signal to be padded, padding is performed to the signal to be padded according to the sample identifier, by rearranging pixels in an image space formed by the signal to be padded and replacing values of insignificant pixels in the image space where the pixels have been rearranged with padding pixel values generated by a prescribed method.

13. The image processing apparatus of claim 12 wherein said predicting section further comprises padding means for performing padding to the reproduced image signal frame by frame or field by field according to the sample identifier, and a frame memory for storing a padded reproduced image signal in which the reproduced image signal has been padded, and outputs the padded reproduced image signal stored in the frame memory to the reproducing section as the prediction image signal.

14. The image processing apparatus of claim 12 wherein said predicting section further comprises a frame memory for storing the reproduced image signal, and padding means for performing padding to the prediction image signal extracted from the reproduced image signals stored in the frame memory frame by frame or field by field according to the sample identifier, and outputs the padded prediction image signal to the reproducing section.

15. An ~~A digital~~ image ~~decoding~~ processing apparatus for performing image decoding, which comprises a reproducing section for reproducing a coded image signal in which a digital image signal has been coded by the use of a prediction image signal of the digital image signal and outputting a reproduced image signal, and a predicting section for producing the prediction image signal from the reproduced image signal,

said reproducing section comprising:

a data analyzing unit for analyzing the coded image signal to extract a compressed difference signal of the digital image and a sample identifier indicating correlation between pixel values of the digital image signal, from the coded image signal;

data expanding means for expanding the compressed difference signal to produce an expanded difference signal; and

an adder for adding the expanded difference signal to the prediction image signal to produce the reproduced image signal,

said predicting section comprising:

padding means for performing padding to the reproduced image signal according to the sample identifier, by replacing values of insignificant pixels in an image space formed by the reproduced image signal with padding pixel values generated from values of significant pixels other than pixels adjacent to the insignificant pixel; and

rearrangement means for rearranging pixels in an image space formed by the padded reproduced image signal according to the sample identifier.

16. A data recording medium for storing a program which makes a computer perform padding of pixel values to a digital image signal forming an original image space comprising an image having an arbitrary shape and comprising significant pixels and insignificant pixels,

said program making the computer perform padding of pixel values according to said digital padding method of claim 1.

17. A data recording medium for storing a program which makes a computer perform padding of pixel values to a digital

image signal forming an original image space comprising an image having an arbitrary shape and comprising significant pixels and insignificant pixels,

said program making the computer perform padding of pixel values according to said digital image padding method of claim 7.

18. A data recording medium for storing a program which makes a computer perform padding of pixel values to a digital image signal forming an original image space comprising an image having an arbitrary shape and comprising significant pixels and insignificant pixels,

said program making the computer perform padding of pixel values according to said digital image padding method of claim 8.

19. A data recording medium for storing a program which makes a computer perform image signal coding,

said program making the computer perform differential coding to a digital image signal by the image processing apparatus of claim 10.

20. A data recording medium for storing a program which makes a computer perform image signal decoding,

said program making the computer perform differential

decoding to a digital image signal by the image processing apparatus of claim 12.

21. A data recording medium for storing a program which makes a computer perform image signal decoding,

said program making the computer perform differential decoding to a digital image signal by the image processing apparatus of claim 15.